CMPG-767/CMPT-477 Image processing and Analysis

Project 1

1. You may use any language, but Matlab is preferable because if you use Matlab, for example you do not need to care about reading, saving, and visualization of images – Matlab contains functions doing all of those.

Assignment for all students

Design the following functions

1) (**undergraduate students – 35 points; graduate students – 15 points**). A function for statistical analysis of an image, which evaluates and returns min, max, mean, standard deviation, variance, and SNR (signal-to-noise ratio) of a gray-scale image. This function shall use an array containing an image as a single argument.
2) (**undergraduate students – 35 points; graduate students – 15 points**) A function, which evaluates, returns and plots a histogram of a gray-scale image. This function shall use an array containing an image as a single argument.

Assignment for graduate students

Design the following functions

3) (**graduate students – 25 points; undergraduate students – 15 extra credit points if 2b-d were done**) A function, which accepts an array containing a gray-scale image as a single argument, performs its histogram equalization, returns an image with an equalized histogram as an output, and visualizes both input and output images. You may assume that the range of an image is {0,…, 255}
4) (**graduate students – 25 points; undergraduate students – 15 extra credit points if 2b-d were done**) A function, which accepts an array containing a gray-scale image as a single argument, its desirable mean and desirable standard deviation, performs its linear contrast correction returns an image with an equalized histogram as an output, and visualizes both input and output images..

2. (**graduate students – 10 points; undergraduate students – 15 points**) Choose a gray-scale image $f(x, y)$.

Design a function utilizing the following (use the functions, which you designed in task 1) for a gray-scale image:

a) Evaluate statistical characteristics of an image using functions designed in 1-1) and 1-2)

For graduate students and undergraduate students working on the extra credit

b) Enhance its contrast using histogram equalization.
c) Enhance its contrast using linear contrast correction.
d) Evaluate statistical characteristics of the enhanced images, plot their histograms and display them in the separate figure windows.

3. (**graduate students – 10 points; undergraduate students – 15 points**) Repeat steps 2 a)-d) for another gray-scale image.

3. Write a brief technical report summarizing your results – you need to include your input and output images and tables with the respective statistical characteristics.

4. Turn in your source code, resulting images and the report in a single zip file.